UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/758,606	01/11/2001	Frank Joseph Pompei	HOLOS-001XX	9889

207 7590 06/04/2007

WEINGARTEN, SCHURGIN, GAGNEBIN & LEBOVICI LLP
TEN POST OFFICE SQUARE
BOSTON, MA 02109

EXAMINER	
CHAU, COREY P	
ART UNIT	**PAPER NUMBER**
2615	

MAIL DATE	DELIVERY MODE
06/04/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/758,606	POMPEI, FRANK JOSEPH	
	Examiner	Art Unit	
	Corey P. Chau	2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 March 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25 and 27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25 and 27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 22 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The limitations of Claim 22 have been covered by the amended Claim 20.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-4, 7-10, 12-14, 25, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6678381 to Manabe in view of "Suitable Modulation of the Carrier Ultrasound for a Parametric Loudspeaker" by Kamakura et al. (hereafter as Kamakura) and USPN 4081626 to Muggli et al. (hereafter as Muggli).

4. Regarding Claim 1, Manabe discloses a parametric audio system for generating at least one airborne audio beam (abstract), comprising:

at least one audio signal source configured to provide at least one audio signal (Fig. 1, 3-4; column 2, line 58 to column 3,line 15).

Manabe does not expressly disclose at least one signal conditioner configured for receiving the at least one audio signal and for nonlinearly processing the audio signal to provide at least one pre-distorted signal. Kamakura discloses a signal conditioner comprising an envelope detector and square-root utilized to reduce distortion (Fig. 1; page 215). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Manabe to utilize a signal conditioner comprising a envelope detector and square-root in order to reduce distortion.

Manabe as modified discloses:

a modulator configured to receive the pre-distorted signal and to convert the pre-distorted signal into ultrasonic frequencies (Manabe, Figs. 1, 3-4; column 2, lines 58 to column 3, lines 22); and

an acoustic transducer array including at least one acoustic transducer, the array being configured to receive the converted signal and to project the converted signal through the air along a selected path, thereby inverting distortion in the projected signal and regenerating the audio signal along at least a portion of the selected path with reduced net distortion (Manabe, Figs. 1, 3-4; column 2, line 58 to column 3, line 40; Kamakura, Fig. 1; page 215),

wherein the acoustic transducer array has a bandwidth greater than 5 kHz (Figs. 1, 3-4; column 3, lines 8-15).

Manabe as modified discloses a plurality of transducer, but only generally; no specific hardware is taught. Therefore it would have been obvious to one having ordinary skill in the art to seek known transducers.

Muggli discloses a sell-type transducer comprising a backplate having a surface and a plurality of depressions formed on the surface, the respective depressions having variable depths (Fig. 1, 4, and 10; column 2, lines 43-62; column 6, line 44 to column 7, line 6);

a membrane adjacently disposed along the backplate (Fig. 1, 4, and 10; column 2, lines 43-62; column 3, lines 33-51; column 6, line 44 to column 7, line 6);

wherein the membrane and at least one of the plurality of depressions define the at least one acoustic transducer (Fig. 1, 4, and 10; column 2, lines 43-62; column 3, lines 33-51; column 6, line 44 to column 7, line 6); and

wherein the bandwidth of the acoustic transducer array is determined at least in part by the depths of the respective depressions (Fig. 1, 4, and 10; column 2, lines 43-62; column 3, lines 33-51; column 6, line 44 to column 7, line 6).

It would have been obvious to one having ordinary skill in the art at to employ any known transducer, such as that of Muggli. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Manabe to have the plurality of transducer of Manabe, include a backplate having a surface and a plurality of depressions formed on the surface, the respective depressions having variable depths (Muggli, Fig. 1, 4, and 10; column 2, lines 43-62; column 6, line 44 to column 7, line 6);

a membrane adjacently disposed along the backplate (Muggli, Fig. 1, 4, and 10; column 2, lines 43-62; column 3, lines 33-51; column 6, line 44 to column 7, line 6);

wherein the membrane and at least one of the plurality of depressions define the at least one acoustic transducer (Muggli, Fig. 1, 4, and 10; column 2, lines 43-62; column 3, lines 33-51; column 6, line 44 to column 7, line 6); and

wherein the bandwidth of the acoustic transducer array is determined at least in part by the depths of the respective depressions (Muggli, Fig. 1, 4, and 10; column 2, lines 43-62; column 3, lines 33-51; column 6, line 44 to column 7, line 6).

5. All elements of Claim 2 are comprehended by Claim 1. Claim 2 is rejected for the reasons stated above apropos to Claim 1.

6. All elements of Claim 3 are comprehended by Claim 1. Claim 3 is rejected for the reasons stated above apropos to Claim 1.

7. Regarding Claim 4, Manabe as modified discloses the membrane-type transducer further includes a conductive membrane , a backplate electrode, and a DC bias source between the conductive membrane and the backplate electrode (Muggli, Figs. 1-6).

8. All elements of Claim 7 are comprehended by Claim 4. Claim 7 is rejected for the reasons stated above apropos to Claim 4

9. Regarding Claim 8, Manabe as modified discloses the Sell-type electrostatic transducer includes a conductive membrane, a backplate electrode, and a dielectric spacer disposed between the conductive membrane and the backplate electrode (Muggli, Figs. 1-6).

10. Regarding Claim 9, Manabe as modified discloses the membrane-type transducer is a Sell-type electrostatic transducer including a conductive membrane, an electrode, and an insulative backplate disposed between the conductive membrane and the electrode (Muggli, Figs. 1-6).

11. All elements of Claim 10 are comprehended by Claim 1. Claim 10 is rejected for the reasons stated above apropos to Claim 1.

12. Regarding Claim 12, Manabe as modified discloses a transducer and a modulated carrier signal and it is implicit that the transducer has an area and the modulated carrier signal has an amplitude, wherein the area and the amplitude is used derive a loudness.

Regarding Claim 13, Manabe as modified discloses a plurality of electro-acoustic transducers may be arrayed, and the number thereof can be adjusted depending on a desired sound pressure, but does not expressly a loudness greater than $(2.0\times10^{4})\ Pa^{2}\times in^{2}$. The loudness, "I" greater than $(2.0\times10^{4})\ Pa^{2}\times in^{2}$ has no patentable significance unless new and unexpected result is produced, therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Manabe as modified to have "I" greater than $(2.0\times10^{4})\ Pa^{2}\times in^{2}$, which would still provide the desired sound quality.

13. Claim 14 is essentially similar to Claim 13 and is rejected for the reasons stated above apropos of Claim 13.

14. All elements of Claim 25 are comprehended by Claim 1. Claim 25 is rejected for the reasons stated above apropos to Claim 1.

15. All elements of Claim 27 are comprehended by Claim 1. Claim 27 is rejected for the reasons stated above apropos to Claim 1.

16. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6678381 to Manabe in view of "Suitable Modulation of the Carrier Ultrasound for a Parametric Loudspeaker" by Kamakura and USPN 4081626 to Muggli as applied to claims 1-4, 7-10, 12-14, 25, and 27 above, and further in view of USPN 4258332 to West, USPN 5345510 to Singhi et al. (hereafter as Singhi), or USPN 5910991 to Farrar.

17. Regarding Claim 5, Manabe as modified discloses at least one driver amplifier coupled between the modulator and the acoustic transducer array and configured to receive the converted signal and to generate an amplified signal representative of the converted signal (Manabe, Figs. 1, 3-4; column 3, lines 1-22).

Manabe as modified does not expressly discloses a blocking capacitor coupled between the driver amplifier and the acoustic transducer array and configured to block the DC bias from the driver amplifier.

West for example, discloses a blocking capacitor coupled between the driver amplifier and the acoustic transducer array in order to prevent DC from entering (Fig. 4; column 10, lines 55-63).

Singhi for example, discloses a blocking capacitor coupled between the driver amplifier and the acoustic transducer array in order to prevent DC from entering (Fig. 2; column 6, lines 20-65).

Farrar for example, discloses a blocking capacitor coupled between the driver amplifier and the acoustic transducer array in order to prevent DC from entering (Fig. 1; column 1, line 62 to column 2, line 5).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Manabe as modified with the teaching of West, Singhi, or Farrar to provide a blocking capacitor coupled between the driver amplifier and the acoustic transducer array in order to prevent DC from entering.

18. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6678381 to Manabe in view of "Suitable Modulation of the Carrier Ultrasound for a Parametric Loudspeaker" by Kamakura and USPN 4081626 to Muggli as applied to claims 1-4, 7-10, 12-14, 25, and 27 above, and further in view of USPN 3565209 to Babcock et al (hereafter as Babcock).

19. Regarding Claim 6, Manabe as modified discloses at least one driver amplifier coupled between the modulator and the acoustic transducer array and configured to receive the converted signal and to generate an amplified signal representative of the converted signal (Manabe, Figs. 1, 3-4; column 3, lines 1-22). Manabe as modified does not expressly disclose a first component coupled between the acoustic transducer array and the DC bias source and configured to block the amplified signal from the DC bias source. Babcock discloses an apparatus to generate an acoustic output that contains a choke (i.e. first component) to prevent the output current from an amplifier from flowing through a bias voltage source as part of a process to reduce distortion of a acoustic

signal (Fig. 2; Fig. 3; column 2, lines 26-30 and lines 52-72). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the toy having a parametric speaker of Manabe as modified with the teaching Babcock to incorporate a choke between the acoustic transducer array and the DC bias source to prevent the output current from an amplifier from flowing through a bias voltage source as part of a process to reduce distortion of a acoustic signal.

20. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6678381 to Manabe in view of "Suitable Modulation of the Carrier Ultrasound for a Parametric Loudspeaker" by Kamakura and USPN 4081626 to Muggli as applied to claims 1-4, 7-10, 12-14, 25, and 27 above, and further in view of USPN 5338287 to Miller et al. (hereafter as Miller).

21. Regarding Claim 11, Manabe as modified discloses at least one driver amplifier coupled between the modulator and the acoustic transducer array and configured to receive the converted signal (Manabe, Figs. 1, 3-4); wherein the converted signal is an undivided signal, wherein the driver amplifier is further configured to generate an amplified signal representative of the undivided converted signal (Manabe , Figs. 1, 3-4). Manabe as modified does not expressly discloses a matching filter configured to compensate for a non-flat frequency response of the combination of the acoustic transducer array and the driver amplifier. Miller discloses a matching filter, which serves to compensate for the specific transducer transfer characteristic and thus provide a flat overall frequency response, which tailors to match the output shaping characteristics of

an amplifier (column 8, line 60 column 9, line 11). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Manabe as modified with the teaching of Miller to provide a matching filter, which serves to compensate for the specific transducer transfer characteristic and thus provide a flat overall frequency response, which tailors to match the output shaping characteristics of an amplifier.

22. Claims 15-17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6678381 to Manabe in view of "Suitable Modulation of the Carrier Ultrasound for a Parametric Loudspeaker" by Kamakura and USPN 4081626 to Muggli as applied to claims 1-4, 7-10, 12-14, 25, and 27 above, and further in view of USPN 4289936 to Civitello or USPN 4323736 to Strickland.

23. Regarding Claim 15, Manabe as modified discloses at least one driver amplifier configured to receive the modulated carrier signal and to generate an amplified signal I representative of the modulated carrier signal (Figs. 1, 3-4). Manabe as modified does not expressly discloses the driver amplifier includes an inductor coupled to a capacitive load of the acoustic transducer array to form a resonant circuit having a resonance frequency approximately equal to the frequency of the ultrasonic carrier signal.

Civitello for example, discloses an inductor coupled to a capacitive load of the acoustic transducer array to form in order to provide the desired power oscillation (Fig. 3; column 3, lines 20-29).

Strickland for example, discloses an inductor coupled to a capacitive load of the acoustic transducer array to form in order to provide the desired power oscillation (abstract; Fig. 2)

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Manabe with the teaching or Civitello or Strickland to utilize an inductor coupled to a capacitive load of the acoustic transducer array to form in order to provide the desired power oscillation.

24. Regarding Claim 16, Manabe as modified discloses the frequency of the ultrasonic carrier signal is greater than or equal to 45 kHz. (Figs. 1, 3-4; column 1, line 63 to column 2, line 24).

25. Regarding Claim 17, Manabe as modified discloses the frequency of the ultrasonic carrier signal is greater than or equal to 55 kHz. (Figs. 1, 3-4; column 1, line 63 to column 2, line 24).

26. All elements of Claim 19 are comprehended by Claim 15. Claim 19 is rejected for the reasons stated above apropos to Claim 15.

27. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6678381 to Manabe in view of "Suitable Modulation of the Carrier Ultrasound for a Parametric Loudspeaker" by Kamakura and USPN 4081626 to Muggli as applied to claims 1-4, 7-10, 12-14, 25, and 27 above, and further in view of USPN 4289936 to Civitello or USPN 4323736 to Strickland, and USPN 4122725 to Thompson.

28. Regarding Claim 18, Manabe as modified does not expressly disclose driving amplifier further including a damping resistor coupled between the inductor and the capacitive load of the acoustic transducer array. Thompson discloses use of an inductor and a damping resistor that are connected electrically across transducers. The inductor resonates with a clamped capacitance of the transducer at a resonant mode frequency of the transducer elements so that a significant amount of driving energy is dissipated in the damping resistor (column 2, lines 52-60). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the toy having a parametric speaker of Manabe as modified with the teaching Thompson to incorporate a damping resistor coupled between an inductor and a capacitor to allow the inductor resonates with a clamped capacitance of the transducer at a resonant mode frequency of the transducer elements so that a significant amount of driving energy is dissipated in the damping resistor.

29. Claim 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6678381 to Manabe in view of "Suitable Modulation of the Carrier Ultrasound for a Parametric Loudspeaker" by Kamakura and USPN 4081626 to Muggli as applied to claims 1-4, 7-10, 12-14, 25, and 27 above, and further in view of USPN 5338287 to Miller and USPN 6229899 to Norris et al. (hereafter as Norris).

30. Claim 20 is essentially similar to Claims 1 and 11 and is rejected for the reasons stated above apropos to Claims 1 and 11, except Manabe as modified does not

expressly disclose a delay circuit configured to apply at least one predetermined time delay to the at least one converted signal.

Norris discloses a delay circuit configured to apply at least one predetermined time delay to the at least one converted signal in order to control the directivity of the transducer (Fig. 1; column 6, lines 31-46). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Manabe as modified with the teaching of Norris to provide a delay circuit configured to apply at least one predetermined time delay to the at least one converted signal in order to control the directivity of the transducer.

31. Claim 21 is essentially similar to Claim 20 and is rejected for the reasons stated above apropos of Claim 20.

32. Regarding Claim 22, Manabe as modified discloses the acoustic transducer array further includes a membrane disposed along an adjacent backplate, the backplate including a plurality of depressions formed on a surface thereof, and each acoustic transducer being defined by the membrane and one or more of the depressions (Muggli, Figs. 1-6).

33. All elements of Claim 23 are comprehended by Claims 20 and 22. Claim 23 is rejected for reasons stated above apropos to Claims 20 and 22.

34. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6678381 to Manabe in view of "Suitable Modulation of the Carrier Ultrasound for a Parametric Loudspeaker" by Kamakura and USPN 4081626 to Muggli as applied to

claims 1-4, 7-10, 12-14, 25, and 27 above, and further in view of USPN 5338287 to Miller and USPN 6229899 to Norris and USPN 4005382 to Beaver.

35. Regarding Claim 24, Manabe as modified does not expressly discloses the delay circuit is configured to apply a predetermined time delay, d, according to the expression d = (x • sin(□))/c, wherein "x" is the distance from a datum to a respective acoustic transducer and "c" is the speed of sound. Beaver discloses proper selection of the delay value between adjacent transducer can accomplish preferential ultrasonic reception or transmission in particular directions (abstract). The delay value is given by the expression Y = (d/c) sin □, where "d" is the spacing between adjacent transducer elements, "c" is the velocity of the ultrasonic wave in the medium through which it travels, and "□" is the steering angle (column 3, lines 41-68; column 7, line 62 to column 8, line 48). Therefore it would have been obvious to one having ordinary to modify Manabe as modified with the teaching of Beaver to utilize a delay value between adjacent transducer can accomplish preferential ultrasonic reception or transmission in particular directions.

Response to Arguments

36. Applicant's arguments with respect to claims 1-25 and 27 have been considered but are moot in view of the new ground(s) of rejection. Further, the newly added references are added only as directly corresponding evidence to support the prior common knowledge finding (i.e. Official Notice), and it does not result in a new issue or constitute a new ground of rejection.

Conclusion

37. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

38. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Corey P. Chau whose telephone number is 571-272-7514. The examiner can normally be reached on Monday-Friday, 9:00am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian Chin can be reached on 571-272-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

May 29, 2007
CPC

VIVIAN CHIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600